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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,141	12/11/2003	Veera Palanivelu Rajendran	133428	7377

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EXAMINER	
JAGAN, MIRELLYS	
ART UNIT	**PAPER NUMBER**
2859	

DATE MAILED: 11/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/733,141	RAJENDRAN ET AL.	
	Examiner	Art Unit	
	Mirellys Jagan	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7-9, 12-22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication 2005/0013342 to Kaminski et al [hereinafter Kaminski] in view of U.S. Patent 5,513,913 to Ball et al [hereinafter Ball].

Kaminski discloses a method for monitoring temperature in at least one location of an electromagnetic coil assembly in an electric machine having at least one electrical winding configured as a coil, the method comprising:

passing a laser light from a variable frequency laser through a non-magnetic optical fiber inserted in a non-magnetic sheath (14 or 22) wound and cast with the electrical winding, the optical fiber having a core containing a plurality of gratings etched therein at different locations along the fiber configured for reflecting light indicative of temperature at a location of the grating;

detecting light reflected from the fiber with a light sensor; and

determining a temperature of the coil assembly using the reflected light (using processing means);

wherein a current is passed through the windings during use (see paragraphs 4, 18, 20, 22, and 28).

Kiminski states that the temperature is determined using known reflected light techniques, but does not go into detail regarding the detection of the reflected light, and therefore does not explicitly disclose the gratings being Bragg gratings wherein a wavelength of light reflected from a first Bragg grating is detected, a temperature of the electromagnetic coil assembly at a location of the first Bragg grating is detected utilizing the detected wavelength of the light reflected from the first Bragg grating; a wavelength of light reflected from at least a second Bragg grating at a location spaced apart from the location of the first Bragg grating is detected, a temperature of the electromagnetic coil assembly at least at a location of the second Bragg grating is determined utilizing the detected wavelength of the light of the reflected from the second Bragg grating; reflected light from the at least the second Bragg grating is distinguished from reflected light from the first Bragg grating using an intensity-based reflectometry (OFDR); light reflected from the plurality of Bragg gratings is used to monitor temperatures at a plurality of locations in the electromagnetic coil assembly; wherein the processor is configured to determine the temperature from the reflected light by using optical coherence domain reflectometry or intensity based reflectometry such as OFDR to determine the temperature.

Ball discloses a temperature-measuring sensor using reflected light from an optic fiber having Bragg gratings, wherein a wavelength of light reflected from a first Bragg grating is detected, a temperature of the electromagnetic coil assembly at a location of the first Bragg grating is detected utilizing the detected wavelength of the light reflected from the first Bragg

grating; a wavelength of light reflected from at least a second Bragg grating at a location spaced apart from the location of the first Bragg grating is detected, a temperature of the electromagnetic coil assembly at least at a location of the second Bragg grating is determined utilizing the detected wavelength of the light of the reflected from the second Bragg grating; reflected light from the at least the second Bragg grating is distinguished from reflected light from the first Bragg grating using an intensity-based reflectometry (OFDR); light reflected from the plurality of Bragg gratings is used to monitor temperatures at a plurality of locations in the electromagnetic coil assembly; wherein a processor is used to determine the temperature from the reflected light and is configured to use optical coherence domain reflectometry or intensity based reflectometry such as OFDR to determine the temperature. Ball teaches that his system is an improvement over other known systems since it provides increased signal-to-noise ratios and resolution over conventional grating fiber sensors.

Referring to claims 1, 13, and 17, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Kaminski by providing Bragg gratings and detecting the reflected light to determine temperature using a technique as taught by Ball, since Kaminski discloses that the temperature is determined using known light reflection techniques, and the system of Ball is a known light reflection technique that provides increased signal-to-noise ratios and resolution over conventional grating fiber sensors when determining temperature using a grated fiber.

Referring to claims 4 and 19, the laser used by Kaminski and Ball is considered to be a variable frequency laser since the applicant appears to define any laser as being a variable frequency laser (see paragraph 19).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminski and Ball, as applied to claims 1-5, 7-9, 12-22, and 25 above, and further in view of U.S. Patent 6,547,435 to Grosswig et al [hereinafter Grosswig].

Kaminski and Ball disclose a method having all of the limitations of claim 6, as stated above in paragraph 2, except for the intensity-based reflectometry technique being OTDR.

Grosswig teaches the using intensity-based reflectometry such as optical frequency domain reflectometry and optical time domain reflectometry in order to measure locally resolved detection of temperature measurements (see column 1 lines 55-67).

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the method of Kaminski and Ball by using OTDR as the reflectometry technique, as taught by Grosswig, since Grosswig teaches that both are useful alternative techniques for measuring temperature using optic fibers.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminski and Ball, as applied to claims 1-5, 7-9, 12-22, and 25 above, and further in view of U.S. Patent 6,636,041 to Arz et al [hereinafter Arz].

Kaminski and Ball disclose a method having all of the limitations of claim 10, as stated above in paragraph 2, except for the electric machine being an MRI system.

Arz discloses an MRI system having optic fibers in a coil assembly of the system for measuring deformations. Arz further discloses in his description of the Prior Art that fiber Bragg gratings can be used as a sensor for acquiring temperature changes in the system, since the Bragg

gratings depend on temperature, which leads to a modification of grid spacings of the Bragg gating and thus to a characteristic change of the wavelength of the light reflected by the Bragg grating; and that temperature sensors can be provided in the windings to monitor the temperature thereof (see column 2, lines 32-41).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Kaminski and Ball by using the method in an electromagnetic coil assembly of an MRI system, as suggested by Arz, in order to control the temperature of the coil assembly to prevent overheating.

5. Claims 11, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaminski and Ball, as applied to claims 1-5, 7-9, 12-22, and 25 above, and further in view of U.S. Patent 4,827,487 to Twerdochlib.

Kaminski and Ball disclose a method having all of the limitations of claims 11, 23, and 24, as stated above in paragraph 2, except for the cooling the coil assembly based on the determined temperatures, or the processor being configured to turn off current through the winding when the determined temperature exceeds a limit.

Twerdochlib discloses monitoring and cooling the temperature of a coil assembly having electrical windings by using a non-magnetic fiber optic inserted in a non-magnetic sheath that is cast and wound with the winding to measure temperatures. The coil assembly is cooled when the temperatures determined by the processor exceed a limit. Twerdochlib teaches that it its desirable to control the temperature of the assembly in order to prevent damage from overheating (see column 2, lines 7-15; column 3, lines 27-39; column 4, lines 18-29; and column 7, lines 30-50).

Referring to claims 11 and 23, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Kaminski and Ball by configuring the processor to cool the coil assembly when the temperatures determined by the processor exceed a limit, as taught by Twerdochlib, in order to prevent damage from overheating.

Further referring to claim 23, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Kaminski and Ball by configuring the processor to also turn off current to the winding in order to provide an emergency shutdown of the system when the temperature reaches extreme conditions.

Response to Arguments

6. Applicant's arguments with respect to claims 1-25 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 11AM to 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ
November 1, 2005

Diego Gutierrez
Supervisory Patent Examiner
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